

REMARKS

This is in response to the Office Action of March 12, 2009. Claims 1-8 are pending in the application.

Background of the invention

As disclosed in paragraph [0005] of the specification, in recent years there has been a growing demand for polyimide resins having very low hygroscopic properties and excellent dimensional stability after moisture absorption. There have been various attempts to produce such resins. For example, JP 02-225522 and JP 2001-11177 disclose polyimides into which a fluorine-based resin is introduced so that hydrophobicity is improved, in order to lower hygroscopic properties. However, the polyimides described therein involve disadvantages such as high production costs and poor adhesiveness to metal materials. Even in other cases of attempting the reduction of hygroscopic properties, as shown, for instance, in JP 05-271410, the prior art has been unable to realize the reduction of the hygroscopic properties while maintaining desirable properties such as high heat resistance and low coefficient of thermal expansion¹. Applicants' invention provides polyimide resins which have low hygroscopic properties while retaining excellent dimensional stability after moisture absorption and other desirable properties.

Obviousness rejection

Claims 1-8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over US 5,071,997 (Harris). Office Action, pages 2-5. The rejection is respectfully traversed.

The polyimides disclosed by Harris correspond to the fluorine-based polyimides mentioned in the discussion of the background of the invention above. The 'Declaration under 37 CFR 1.132' enclosed herewith establishes that the polyimides of the present

¹ All three of the Japanese patent publications mentioned in paragraph [0005] of the specification were cited in the IDS filed in this application on September 25, 2006.

invention are unexpectedly superior to the polyimides of Harris. For instance, the presently claimed polyimides are unexpectedly superior to the Harris polyimides with respect to chemical stability, and the present polyimides are subject to little or no solvent solubility.

Before considering the comparative data reported in the Declaration in detail, Applicants point out that, while Harris discloses compounds that are similar in some respects to compounds embraced by Applicants' claims, in the Harris compounds, the moieties which correspond to the -OR substituent in Applicants' compounds are depicted as "-A." Applicants' -OR substituent is an oxygen atom joined to an "R" group which is defined as a hydrocarbon group having 3 to 6 carbon atoms. Thus, Applicants' -OR substituent may be, for instance, a propoxy group. All of the specifically disclosed embodiments in Harris show "-A" as being a trifluoromethyl group. Harris provides a generic teaching – in lines 2-11 of column 11 – that the "A" group may be "an alkyl group, a substituted-alkyl group ..., a cyano group, an alkyl group, a nitro group, a thioalkyl group, an alkoxy group, an aryl group or a substituted aryl group." This generic disclosure in Harris, coupled with the Harris specific disclosure of trifluoromethyl groups as embodiments of "A," would not lead persons of ordinary skill in the art to a hydrocarbon group having 3 to 6 carbon atoms.

Nevertheless, Applicants' present herewith the Rule 132 Declaration of Dr. Hongyuan Wang. In the Declaration, Experiments 1 and 2 correspond respectively to Examples 5 and 10 in Applicants' specification, while Experiment 3 corresponds to Example 1 of Harris.

Comparison of Experiments 1 and 2 (the present invention) with Experiment 3 (Harris) indicates that the peel strength of the polyimides in Experiments 1 and 2 is roughly five times that of the polyimide in Experiment 3.

Harris indicates that his polyimides show good solubility which is another way of disclosing that his polyimides show poor solvent resistance. In contrast, a film of polyimide E in Experiment 1 and a film of polyimide J in Experiment 2 show no change when immersed in a strongly alkaline etching solution. That is, compositions provided by the present invention have good solvent resistance.

Dr. Wang concludes from the results on the experiments reported in his Declaration

that the polyimides of the present invention are comparable in resistance to heat, in thermal expansion, and in moisture absorption to the polyimides disclosed by Harris, but that the polyimides of this invention are far superior in adhesive properties and chemical resistance (solvent resistance) to the polyimides disclosed by Harris. Dr. Wang concludes further that "the polyamic acids and polyimides of this invention can be said to produce effects which are not expected from those disclosed by Harris." Declaration under 37 CFR 1.132 executed on 29 July 2009, page 6.

In summary, Applicants do not believe that the present claims contain subject matter that is rendered *prima facie* obvious by the generic disclosure of Harris. In any event, a *prima facie* case of obviousness based upon Harris is rebutted by the unexpected beneficial results demonstrated in the Rule 132 Declaration which accompanies this Amendment.

Contact information

If there are any questions concerning this application, the Examiner is invited to contact Richard Gallagher, Registration No. 28,781, at (703) 205-8008.

No fee is believed to be necessary in connection with this response. If any fee is determined to be necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.147.

Dated: **AUG 12 2009**

Respectfully submitted,

By 

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